CEMRK-ED-FH (200-1c) 21 July 1988

MEMORANDUM TO ED-FH FILES

SUBJECT: Trip Report, Lake Ontario Ordnance Works, Lewiston-Porter, NY

1. Field oversight was performed from 24 May to 1 July 1988. Field activities consisted of monitor well drilling and installation as well as a limited amount of well development. A geophysical survey was completed prior to site arrival.

2. The A-E for this site is ACRES International Corp. of Buffalo, NY. Rochester Drilling of Rochester, NY was subcontracted for all drilling and well development. Synergist Inc. was subcontracted to perform all health and safety functions which included air monitoring. Site access was controlled by SCA Inc. which maintains sanitary and secure landfills on-site.

3. All individuals planning to work at the site were given a safety briefing by Bob Sawyer of SCA in addition to a second briefing by Synergist personnel. SCA regulations required that individuals working on-site be clean shaven and wear hard hats, long sleeve shirts, safety glasses, and steel toe work boots. All individuals on-site had also completed the 40-hour hazardous waste course and a respiration fit test. The drillers and helpers were fit tested by Synergist. Rob Dixon of Synergist was present when all work was performed while Terry Shannon made periodic site visits and gave health and safety briefings.

4. All items used for drilling, sampling, and well installation were decontaminated with a high pressure steam wash and rinse prior to drilling. A temporary decon pad was constructed using plastic sheeting sloped toward a low sump area for water collection. Decon water and sediment were stored in 55-gallon drums. After using the decon pad for two weeks SCA requested that ACRES dismantle the pad and begin using their permanent concrete decon facility. SCA was concerned that the pad may have been leaking or have overtopped on occasion and that decon water may have flowed into surface drainage areas which are monitored. SCA also requested that all excess grout, cuttings and fluids be drummed at each well location because of the possibility of obtaining high pH and TDS values from surface waters if any grout-laden materials came in contact with drainage networks. There are several drainage ditches across the site and many are in close proximity to well locations thus the concern over grout was valid but there was not evidence that the decon pad was leaking

or had been overtopped even though the general appearance was somewhat unkempt. The initial plan was to use the SCA decon area but scheduling times for pad use appeared to be a problem so ACRES constructed their own pad. ACRES removed their decon pad and began using the SCA facility and there were no major problems with scheduling.

5. a. Drilling was performed with a Mobil Drill B-61 rotary rig with one driller and two helpers. Most monitoring well locations consisted of paired wells where a shallow well monitored an upper clay and silt zone with a very low transmissivity underlain by a soft blue gray silty clay aquitard. The paired deep well monitored a lower confined unit consisting of silts and sands and was more transmissive than the upper unconfined unit. When drilling the deep well borings the borehole was advanced with 8-inch I.D. 12-inch O.D. hollow stem Mobil Drill augers into the top of the silty clay aquitard. Steel surface casing with a 7-3/4-inch I.D. and an 8-inch O.D. was then grouted in place to seal off the upper saturated zone. Deep well boreholes were advanced to bedrock and typically penetrated the bedrock surface 1-2 feet. Before installing a well the open hole in the bedrock was plugged with bentonite pellets. The bedrock consisted of a reddish brown shale and was immediately overlain by a reddish brown glacial till. Deep well boreholes were advanced below the grouted casing with 6-3/8-inch I.D. 6-5/8-inch O.D. casing with a bit, similar to a core barrel. This drilling method served the dual function of casing the hole below the grouted upper casing and cleaning out and advancing the borehole between 1-3/8-inch I.D. split spoon sampling. All deep well borings were continuously sampled with standard split spoons driven 2 feet by a 140-pound hammer falling 30 inches with blow counts recorded per 0.5 foot. Problems were encountered grouting the surface casing on the first two wells, MW-C-ID and MW-D-1. Smaller augers with an I.D. of 6-1/8 inches and an O.D. of 9-1/2 inches were used and there was not sufficient annular space to obtain grout return at the surface between the borehole and outside surface of the casing. The casing was forced into the hole with the rig by successively dropping the entire length of casing with a winch line. A request was made to ACRES that either larger diameter augers or smaller diameter casing be used in order to ensure that the casing was effectively grouted into the aquitard thus separating the upper and lower water bearing units and eliminating the possibility of cross contamination.

ACRES agreed and requested larger diameter 12-inch O.D. augers from Rochester Drilling which they supplied. After grouting the casing there was a minimum set up time of 48 hours with the option of using a calcium chloride accelerator then waiting 24 hours before continuing to drill. When using the calcium chloride accelerator, two pounds were added for each 94-pound bag of Portland Type I cement used. The calcium chloride was added with a measuring cup to water then circulated before adding cement. The brand was General Chemical Flake calcium Chloride, 77% pure. At each well location timing and future drilling was considered before deciding whether or not to use the accelerator on a given well. The typical cement/bentonite grout mixture consisted of 8 to 8.5 gallons of water and 3 pounds of bentonite per 94-pound bag of Portland and was mixed and pumped with a rig mounted 3L8 moyno pump and tremied through a 1-1/4-inch O.D. hose. Granular Volclay bentonite was used in the grout mixtures. Powdered bentonite would have been preferable since it is more easily hydrated and a jetting device was not used during mixing.

b. A suggestion was made to keep the base of the tremie hose a minimum of 5 feet above the bentonite seal when placing grout in order to avoid jetting the seal since no type of deflector was utilized. When mixing grout a jetting device or mud gun was not used thus materials were poured in water contained in a 55-gallon drum and circulated and mixed with the rig pump. It was suggested that the bentonite be mixed with water prior to adding cement so as to achieve maximum hydration. The grout mixtures were more viscous when the bentonite and water were mixed first. After the necessary set up time the grout was drilled from the interior of the surface casing with a 6-5/8-inch tricone rock bit then the sump was drained and the borehole flushed to remove all grout cuttings and fluids which were then stored in 55-gallon drums.

c. Shallow well borings were drilled with 6-1/8-inch I.D. 9-1/2-inch O.D. augers with two split spoon samples taken from the screened area and one sample taken of the aquitard material. The deep wells were continuously sampled and drilled first so the shallow wells were relatively easy to drill and the number of samples was small. There was concern over the presence of water in several shallow well borings. Some holes were left open overnight and over the weekend in order to determine if water was present because several holes were dry after drilling.

d. Cuttings were spread on the ground surface unless elevated air monitoring readings were observed or grout was present. A suggestion was made that the paired wells should be oriented perpendicular to the groundwater flow direction to more effectively monitor the desired area. The source of water used for drilling was a hydrant southeast of secure landfill (SLF) #7, which was chemically tested in the past.

6. Monitor wells were constructed of 4-3/8-inch I.D. 4-1/2-inch O.D. flush joint PVC schedule 80 riser and 0.010 inch factory slotted screen. Threaded flush joint end caps were not available so PVC caps were attached to the bottom of the wells with screws. Stainless steel screws were used on all caps with the exception of well MW-D-1. The filter pack consisted of fine grained, poorly graded, #2 silica sand which was placed by tremieing with water. Various diameters of PVC pipe as well as 1-1/4-inch hose were used to tremie the filter pack sand based on the working diameter of the borehole, which varied from deep to shallow well. The filter sand was placed a minimum of 2 ft. above the top of the screen and then a minimum 2 ft. bentonite seal was placed and allowed to hydrate for 12 hours, The depth of the sand pack was taped as well as the depth of the open hole prior to setting the well. Bentonite pellets used for well seals were 1/8-inch and manufactured by Roctest. After a 12-hour wait the top of the seal was taped and then the above-mentioned cement bentonite grout mixture was tremied. Seal expansion varied with hydration time and averaged 2 ft. thus making a 4-ft. seal for a 12-hour wait. The maximum seal expansion was 10 ft. after a five day wait thus yielding a 12-ft. seal. Approximately 6 inches of filter sand was placed above the bentonite seal before grouting the deep wells. The well seals on the shallow wells were very close to the surface and there was not a substantial amount of grout placed above the seal so the 6-inch sand layer above the seal was omitted. The minimum depth of the base of the bentonite seal was 3.5 ft. thus making the top of the seal at 1.5 ft. below ground surface. These shallow depths were necessary in order to screen the water table surface in the shallow wells. Locking steel protective pipe was placed over all wells and mounded concrete surface pads were also installed. Wells were labelled and stakes were placed around the perimeter. Drilling logs, well installation diagrams, and development records were completed.

Care was taken to document any water added during drilling or well installation for development purposes. Field notebooks were kept and initial drilling logs were completed by transferring information from field notebooks to log sheets. There were unnecessary delays submitting completed logs due to the time required to recopy information. It was suggested that all drilling logs be completed in the field as drilling and well installation progressed so as to obtain more accurate information and eliminate the time required to complete final logs from field notebooks, The A-E agreed. All information appeared to be accurate and detailed.

7. Boreholes for MW-C-1D and MW-D-1 were drilled using a teflon based lubricant called Realtuff manufactured by Hercules Chemical Company. The driller was planning on using this lubricant for the entire job and stated that he had used it for environmental work on New York State jobs and that the state had approved its use. ACRES was in agreement with the drilling company until the Corps contacted the manufacturer and found that it consisted of other ingredients such as mineral spirits which could potentially alter chemical analyses. Crisco solid vegetable oil and teflon tape were used as lubricants when drilling all remaining boreholes,

8. Environmental samples from well borings were not collected. All soil samples retained during monitor well drilling were for visual and geotechnical analysis. There was an initial problem with geotechnical soil sample collection. Different materials such as clay and sand were mixed to from one sample when discreet change of material samples should have been taken. The sample mixing only occurred during the early stages of the first borehole and will not involve samples submitted for testing which will come from lower screened intervals.

9. Health and safety functions were subcontracted by ACRES to Synergist Inc. of Philadelphia, PA. Synergist personnel performed all air monitoring, set up exclusion zones, decontamination areas, and determined the level of personal protective clothing. Personal air monitoring sample filters will be submitted to a laboratory for VOA and metals analysis. A portable pump was attached to various individuals in order to pump air through filters which will be analyzed. Personal radiation badges will be laboratory tested at job completion. Air monitoring was carried out using

Victoreen 493 and Thyac III radiation meters, a Gastech 1413 oxygen meter, Draeger bellow tubes for H2 and HCL, and an Organic Vapor Analyzer (OVA). Air monitoring instruments were wrapped in plastic and sealed with duct tape. Background air surveys were conducted at every location prior to drilling. During drilling air measurements were taken from the borehole, breathing zone, and samples. OVA air monitoring was occasionally erratic in the wooded area due to the large volumes of necessary mosquito repellent that was used. Exclusion zones were set up at a 30-foot radius from the borehole and consisted of wooden stakes joined with yellow construction flagging. Personal decon areas consisted of boot and glove wash and rinse solutions in tubs underlain by plastic in the exclusion zone. Water sprayers and an eye wash system were also available. The first 25% of each boring with the exception of paired shallow borings were drilled in full level C then downgraded to modified level D if no readings above background levels were obtained. Level C clothing consisted of a hard-hat, air purifying respirator, tyvek suit taped at wrists and ankles, neoprene steel toe boots, inner and outer gloves, and radiation detection badges. Modified level D excludes respiratory protection, taping at wrists and ankles, and includes safety glasses. All health and safety procedures appeared to be good and in compliance with workplan specifications.

10. Elevated air monitoring measurements averaging 3 ppm above background levels were continually observed during the drilling of MW-B-3 which was completely drilled and installed in full level C protective clothing. This well was located north of SLF #7 and west of Area A adjacent to a road between SLF #7 and Area A. Trucks containing hazardous waste line up on this road to wait for a specific time to place their loads in the secure landfill currently being used east of SLF #7. All roads on-site are continually watered by trucks to minimize the effects of any possible airborne contaminants in dust stirred up by traffic. Run-off from frequent road watering occasionally flows laterally off the roads. The elevated readings from well MW-B-3 may be related to the close proximity of the well to the main road where waste haulers wait to dump their loads. Other boreholes in which elevated OVA readings were obtained in included MW-C-2D and MW-C-3D. Nearly continual readings of lppm above background were

obtained from the borehole of MW-C-2D with all measurements from samples and the breathing zone being normal. Readings of 0.5 ppm above background were obtained at 2-4 feet deep from the borehole of MW-C-3D with all other measurements from samples, the breathing zone, and other borehole depths being normal. No other readings above background levels were obtained when drilling other holes and elevated readings were not obtained from any instruments except the OVA measurements described above.

11. After drilling out the grouted casing on MW-C-3D in preparation for sampling below the cased depth it was noticed that water was coming out of two small fissures at the ground surface approximately 40 feet northeast of the borehole. The fissures were approximately one foot in length with relatively clear water flowing out at a low rate. There was concern that this was related to the grouted casing which separates an upper unconfined unit from a lower confined aquifer and that the casing may not be effectively grouted. As a precaution the casing was regrouted and when drilling resumed at a later date no water was observed flowing from the cracked surface areas. It is indeterminate whether or not the surface cracks and associated flow were related to drilling procedures, ineffective grouting, or other site conditions related to landfills, excavation, or clay storage areas which were in close proximity to the borehole.

12. Limited well development consisting of bailing was carried out before all wells were installed. Most shallow wells were quickly bailed to dryness with the development water appearing very turbid and clay rich, usually reddish brown in color. Exact recharge times were not determined but are most likely in the 1/2-day range or longer for the shallow wells. The bailed water from the deep wells was also very turbid and clay rich as above but the deep wells could not be bailed to dryness thus they are more transmissive than the shallow wells as expected. Bailers were approximately 2-1/2-inch O.D., 5 feet in length, constructed of PVC, and bottom filling with a check valve. Nylon rope was used to raise and lower the bailers. All bailers and rope were dedicated or well specific. Bailed water was placed in S-gallon

containers or 55-gallon drums in order to record the volume removed then discarded on the ground surface with the exception of monitor well MW-B-3 development water which will be drummed due to elevated air monitoring measurements during drilling. Development criteria calls for removal of 3 times the water introduced during drilling as well as parameter stabilization and relatively clear water. It appears that clarity will be the major concern as well as the reason for continued development even after volume and parameter requirements are met. Surging was carried out by agitating the bailer but a surge block as well as other types of pumping are proposed for use during future well development.

13. There were problems with Rochester Drilling during a great deal of the field work performed. The quality of the work was fair in most instances but work practices and preparedness were very poor. Work proceeded at an extremely slow pace. On many occasions work was stopped because necessary supplies such as cement, filter sand, well screen, well riser, casing, wrenches, etc. were not at the site or were on-site but were not decontaminated and ready for use. Several trips were made to town to obtain supplies and all crew members usually went leaving no one to complete other tasks that needed to be done. When this job was bid the subcontractor should have had a good idea of the quantity of supplies needed to efficiently complete the work. On Fridays the crew typically worked 1/3 to 1/2 of a day before departing and no extra hours were worked during the week to compensate. The crew also tried to circumvent certain practices that they knew were required such as tremieing the filter pack sand, and waiting the required times for grout and bentonite seal set up. On one occasion I observed the driller tremieing sand in a deep well set at 40 feet with the base of the tremie pipe 5 feet below the surface. Of the 16 monitor well boreholes,casing or samplers were twisted off in 4 holes or 25% of the borings. One hole had to be redrilled because lost casing could not be retrieved. The subsurface materials at this site were not sufficiently difficult to drill that one would expect to lose equipment in 25% of the holes. Due to the slow progress a second Mobil Drill B-61 rig and three crew members were brought on-site. Even with a second rig the efficiency was very poor. Each rig was not adequately supplied so equipment such as augers and casing had to be shared which lead to many delays due to scheduling, decontamination, and traveling from rig to rig. ACRES complained to Rochester Drilling on several occasions and

eventually requested that an individual make a site visit. Rochester Drilling foreman Steve Deloura made a site visit and met with ACRES personnel to discuss their grievances. No real change occurred after the site visit and in my opinion there was valid justification for ACRES to be unsatisfied with the performance of the drilling company.

14. In summary, all completed work did adhere to specifications but required an inordinate amount of time to complete. Rochester Drilling would not be recommended for any future work. ACRES personnel appeared to be very conscientious and concerned about the quality of their work and considering the circumstances did a quality job.

David Drake
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CF:
CEMRD-ED-G thru CEMRK-ED
ED-T

STONE
ED-FH

MOYLAN
ED-F

BADER
ED-T

BARBER
ED